Remanufacturing vs. New Procurement

A Proven, Cost-Effective Strategy to Interject Technology Upgrades, Reduce Acquisition Costs for New Equipment

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As military budgets decline and equipment continues to age, DoD must find ways to get the most out of taxpayers' dollars. Remanufacturing is a proven method to interject technology upgrades and reduce acquisition costs for new equipment.

Aging Vehicle Fleet

The U.S. Army has an acute aging situation in some of its tactical wheeled vehicle fleets due to insufficient funding. Tactical wheeled vehicle funding decreased over the years, with the most critical funding shortages occurring in 1996 and 1998. If DoD delays or halts modernization, aging of the tactical wheeled vehicle fleet will continue to cause the escalation of operation and support costs and the reduction of readiness rates.By 2002, 38 percent of the Army's vehicle fleet will exceed its economic useful life, and 60 percent will be overage by 2010.

The 2½-ton, 5-ton, and Heavy Equipment Transporter (HET) system fleets are in the worst condition. Generally, the economic useful life of these vehicles is 20 years for the 2½-ton, 22 years for the 5-ton, and 14 years for the HET. And the average vehicle age for the 2½-ton truck is 25.7 years, the 5-ton is 15.6 years, and 13.1 years for the HET system.[1]

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Modernization — A Costly Endeavor

In 1993, the Army analyzed its entire tactical wheeled vehicle fleet situation to determine the investment required to keep the fleet modern. As a result of this analysis, the Under Secretary of Defense (Acquisition & Technology) completed a Report to Congress on Tactical Wheeled Vehicle Investment Strategy.[2] According to the report, the funding necessary to adequately modernize the light, medium, and heavy fleets over the next 10-15 years is $600-$800 million per year. This level of tactical wheeled vehicle funding would stabilize fleet ages within economic useful lives.[3] However, this rate of spending is currently unaffordable for the Army, in light of reductions planned in the Army's research, development, and acquisition budgets.

Yes, There's a Plan

The Army's solution to this critical situation, as outlined in the Tactical Wheeled Vehicle Investment Strategy, is a combi-

2½-Ton Remanufactured Vehicle

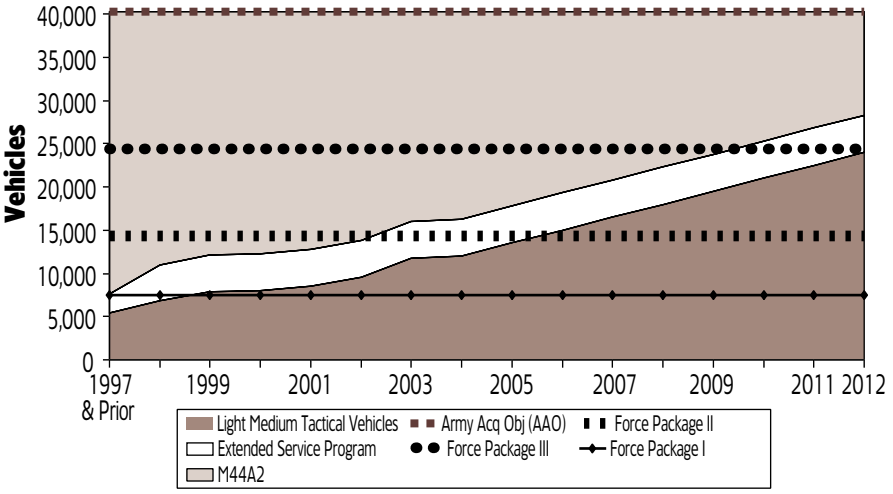
Photo courtesy U.S. Army Aberdeen Test Center

nation of new procurement and remanufacturing of existing vehicles.

The attempt to use a remanufacturing approach to fleet modernization is not a new concept. This approach has been used quite successfully for armor and aircraft systems. Historically, the Army has designed, built, and tested prototype trucks, incorporating variances from other trucks, calling the final result a product improvement. During the 1970s, these early attempts at remanufacturing trucks proved to be too costly; therefore, this method of building trucks never moved into the production phase.

The Army's Family of Medium Tactical Vehicles (FMTV) acquisition plan projects that the 2½-ton and 5-ton fleet requirements will be filled with FMTVs by 2022. Under this strategy, approximately 10,000 FMTVs will be beyond their economic useful life by the time all of the older M44- and M939-series trucks are replaced with FMTVs (Figure 1).

FIGURE 1. **No Additional 2½-Ton ESP Production After 1999**



Remanufacturing Program

In 1996, the Army established its Medium Tactical Wheeled Vehicle (REMAN) program, led by product manager, Army Lt. Col. George R. Schneller. He and the Remanufacture Program Team were charged with managing two medium truck programs—the 5-ton Tactical Truck Remanufacture Program and the 2½-ton Extended Service Program. These programs provided a cost-effective means to assure an adequate inventory of modern medium tactical trucks by remanufacturing a portion of the existing 2½-ton and 5-ton fleets in a "total force" framework, in conjunction with brand new trucks provided through the FMTV procurement.

The remanufactured vehicles meet current emission standards and include numerous safety improvements. Moreover, the vehicles are equipped with a new engine; a central tire inflation system and super single radial tires for enhanced mobilit; automatic transmission; power/power assist steering; and an antilock brake system (ABS) for the 5-ton. ABS was under development as an upgrade to future production models of the 2½-ton. The remanufacture programs allow the total Army (Active, Reserve, and National Guard) to enhance readiness and reduce cost in a time of declining defense spending.

Since the Army does not have an adequate number of medium tactical wheeled vehicles available to proceed solely with remanufacture without seriously impacting unit readiness, new production is necessary to free old assets while maintaining an acceptable state of readiness. The Army Tactical Wheeled Vehicle Investment Strategy calls for the

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Lt. Col. George Schneller, U.S. Army, received his commission as a second lieutenant, Ordnance Corps, in May 1978 from Arkansas Tech University. His initial assignment was with the 3rd Infantry Division at Schweinfurt, West Germany, where he served in a variety of maintenance platoon and staff positions, culminating in the command of a forward support maintenance company. Upon completion of the Ordnance Officer Advanced Course, he was reassigned to Germany as the fielding Officer for the Tactical Wheeled Vehicle Fielding Team, Europe.

Upon returning to the United States, Schneller was assigned as the maintenance officer to the 94th U.S. Army Reserve Command, headquartered at Hanscom AFB, Mass. From there, he participated in the Training with Industry program at Deere and Company in Moline, Ill.

Assigned to the Program Office, Tactical Wheeled Vehicles in 1990, he served as the Fielding Officer, Assistant Project Officer on several Heavy Truck programs, and Executive Officer to the Program Executive Officer. After graduation from the Defense Systems Management College (PMC 95-1), he served on the staff of the Assistant Secretary of the Army for Research, Development and Acquisition. Since September 1996, he has been assigned as the Product Manager for the Medium Tactical Wheeled Vehicle Remanufacture Program with Program Executive Office, Ground Combat and Support Systems.

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remanufactured vehicle to be fielded concurrently with the new 2½-ton, Light Medium Tactical Vehicle (LMTV).

Extended Service Program

Under congressional direction, the Army initiated its 2½-ton Extended Service Program in 1991. Congress set two program objectives for the Extended Service Program: produce a vehicle with 80 percent of the service life of a new vehicle and at 50 percent of the cost.[4]

The Extended Service Program remanufactures older M44A2-series 2½-ton trucks into a new M44A3 configuration. The remanufacture process starts with the shipment of older vehicles from the field to the contractor's facility. Vehicles inducted into the program are excess field turn-ins and displacements from new and remanufactured fielding. Once received, the vehicles are completely torn apart and disassembled. Parts not reused are disposed of or sold as scrap for funds that can be credited back into the contract. Parts slated to be reused are thoroughly inspected. Those deemed suitable for use are refurbished, repaired, and modified, as required.

For planning purposes, the Remanufacture program team factored in a ratio of three older vehicles to produce two suitable platforms to receive the new or refurbished subsystems. These parts, along with numerous new parts, are used to feed an assembly line.

In May 1992, the government awarded two Extended Service Program prototype development contracts: one to Cummins Military System and one to AM General Corporation (AMG). Each contractor remanufactured eight vehicles that the government tested for performance. Based on test results as well as production proposals, the government then awarded AMG a five-year multiyear production contract in September 1993. The addition of several performance enhancements not originally envisioned (automatic transmission and central tire inflation system) increased the cost of the remanufactured vehicle to about 60 percent of the cost of a new vehicle. However, this cost was offset by the value of increased mobility enhancements.

Overall, the remanufactured vehicle (M44A3) met 95 percent of the performance requirements at 60 percent of the cost of a new FMTV. The service life of the remanufactured vehicle is now projected to be equal to that of a new truck.

According to Schneller, "The 2½-ton Extended Service Program proved that remanufacturing of older trucks on a large scale is a cost-effective strategy to provide modernized vehicles to the force until new trucks can be procured and fielded."

Cancellation Due to Insufficient Funds

The 5-ton Tactical Truck Remanufacture vehicle program began in November 1996 under the Medium Tactical Truck Remanufacture (MTTR) program. Two contractors, Oshkosh Truck Corporation and AMG, each built five prototype trucks using portions of the basic model M939 trucks along with technology insertion. Together, the two contractors completed prototype testing of these vehicles in about half the allotted time, with a reliability rate three times the requirement. Regrettably, the Army cancelled the 5-ton Tactical Truck Remanufacturing effort at the end of its research and development phase in June 1998, due to insufficient funding for the medium truck program.[5]

In 1998, after producing 5,483 vehicles (M44A3), the Army discontinued remanufacturing due to lack of funds. However, the program did accomplish the goals established by the Army's Tactical Wheeled Vehicle Investment Strategy. Clearly, M44A3 remanufacturing is a viable alternative to procurement of new equipment.

To some, cancellation of the two programs may appear arbitrary; however, it is important to recognize and understand that the Army modernizes its vehicle fleet according to a four-level Force Package structure. Force Package I units maintain the highest readiness rate. The standard modernization approach is to

focus on Force Package I units first and to finish with Force Package IV units. This approach is a requirement-based allocation of equipment that is priority-driven and constrained by resources.

Force Package I

Using the Tactical Wheeled Vehicle Investment Strategy as guidance, units designated Force Package I are combat-ready units and are equipped with the newest most technologically advanced trucks. A mix of remanufactured vehicles and new vehicles (FMTV) fills this requirement as long as all vehicles are within their economic useful life.

Force Package II

Force Package II units contain remanufactured vehicles with technological insertion. They may also contain new technologically advanced vehicles if funds permit.

Force Package III

Force Package III units receive cascaded equipment from higher Force Packages. Cascaded equipment is displaced equipment fielded as a redistribution of an existing Army capability previously fielded from one organization to another. These units could receive remanufactured vehicles with technological insertion or new technologically advanced vehicles, if funds permit.

Force Package IV

Force Package IV units are equipped with vehicles cascaded from other Force Packages that are usually overhauled and rebuilt vehicles. If funds permit, IV units may also receive remanufactured vehicles with technology insertion or new technologically advanced vehicles.

During the 2½-ton remanufacture effort, new LMTVs were being fielded into Force Package I units, and remanufactured trucks were being used to modernize Force Package II through IV units, which include the Army National Guard and Reserve. Presently, the average age of the Army National Guard's 2½-ton fleet is 26 years, long past the economic useful life of the vehicle. Continuation of remanufacture programs would allow Force Package III and IV units to begin fleet modernization earlier.

By combining new production with remanufacture, the Army could modernize the 2½-ton fleet five to 10 years sooner than buying all new vehicles. This would also set a precedent to begin planning a remanufacture program for the FMTV (Figure 2).

Bottom Line — Modernized Vehicles to the Force

The aspect of remanufacturing has significant implications in the future of tactical wheeled vehicles. The 2½-ton Extended Service Program proved that remanufacturing of older trucks on a large scale is a cost-effective strategy to provide modernized vehicles to the force until new trucks can be procured and fielded.

Recently, the Army began a remanufacture program for the Heavy Expanded Mobile Tactical Truck (HEMTT) with Oshkosh Truck Corporation, and is also investigating a remanufacture program for the High Mobility Multi-purpose Wheeled Vehicle (HMMWV).

"With the escalating cost of new trucks," said Schneller, "the challenge is to develop business plans and investment strategies to support a balance of remanufacture and new production, thus maximizing the number of modern vehicles supporting our armed forces today and into the future."

Editor's Note: Schneller retired from active duty Oct. 1, 1999. Currently, he is the Senior Program Manager, Government Division for Technology Ventures, Inc. Schneller encourages questions or comments about the program. Contact him at **gSchneller@technologyventures.net.** The Medium Tactical Wheeled Vehicle (REMAN) Program Office, which also manages the U.S. Marine Corps Medium Tactical Vehicle Replacement (MTVR) program, is now led by Product Manager, Army Lt. Col. Walter R. Raymond Jr. The author also encourages questions or comments on this article. Contact her at **BrownS@tacom.army.mil.**

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FIGURE 2. **2½-Ton Fleet Composition, 2½-Ton Extended Service Program, and Light Medium Tactical Vehicle Production**